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COMMONWEALTH OF PENNSYLVANIA.

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# STATE BOARD OF HEALTH.

## CAMP HYGIENE.

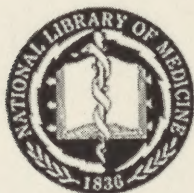
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ADDRESSED TO MEDICAL OFFICERS OF THE NATIONAL  
GUARD OF PENNSYLVANIA.

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# A MANUAL OF HYGIENE

FOR THE USE OF

MEDICAL OFFICERS OF THE NATIONAL GUARD OF PENNSYLVANIA, AND OF  
OTHER BODIES HOLDING ENCAMPMENTS WITHIN THE COMMON-  
WEALTH OF PENNSYLVANIA. PREPARED BY THE COMMIT-  
TEE ON PREVENTABLE DISEASES OF THE STATE  
BOARD OF HEALTH.

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## CAMP HYGIENE.

### Sanitary Duties of Medical Officers.

From a sanitary point of view, a medical officer of the National Guard has three classes of duties to perform. The first, to assist in the selection of a suitable site for the camp; secondly, to aid in laying it out, and, thirdly, to supervise the sanitary condition of the encampment while it is in existence.

#### Selection of Site.

Of course, during time of war, expediency must often override other considerations in selecting a site for a camp; but for our annual encampments more judgment can be used. It may be argued that it is not so important that a healthy site should be a consideration, because the period of encampment is so short; but this is a fallacious argument, for it is long enough to permit of the causation of sickness, or even death, that may be avoided.

“Wood, water, grass and dryness of soil,” may be set down as the prime essentials that should be always before the eye of the medical officer who is inspecting a proposed camp site. You must avoid the neighborhood of marshes, river bottoms, overflowed lands, deep alluvium, lands subject to occasional salt water inundations and sands, however barren the surface, if there be subjacent water. Shrubby plants are denounced as indicating dangerous ground, because they are evidences of active fermentative changes going on therein, and, by cutting away of these shrubs, there will be allowed a chance for the diffusion of unhealthy emanations that would otherwise have been absorbed by them.

The best site for a camp will be a grassy elevation, where the superficial layer is gravelly, with rock at a good depth. These can usually be discovered by a general survey of the ground; but, if doubt exists as to the last, a few men with pick-axes and spades can soon settle it. As our encampments are always held in the summer, advan-



tage must be taken of woods for shade, if not so dense as to interfere with ventilation. Prevailing winds must be observed, in order that we may place the camp to windward of suspicious swamps and rich alluvial ground. In this section of the country, southerly winds prevail in summer; hence, you want to place the camp on the south side of a woods, if one exists, that the wind may have free access thereto.

If in a mountainous region, we must remember that there are nightly breezes from hill to plain, and guard against them. A dusty site combined with glare, will be hurtful to the eyes. Old camp grounds should be avoided, because of their previous contamination. NEVER SELECT A HOLLOW. Perhaps the worst of all kinds of soil for a camp is that in which sand and humus form the upper stratum, the lower or sub-soil being formed of clay. Rain, which falls on such ground, instead of rapidly evaporating, soaks into and through the first stratum, and, passing into the clayey sub-soil, is absorbed and causes the surface to remain for a long time damp and unhealthy.

We should always look for springs, that we may be sure of a good water supply, and a guard should be placed about the sources of supply at the very first advent of the soldiers into camp, that they may be guarded from pollution. If, as is now frequently done, the water is conveyed to the camp from a distance, you should carefully investigate the proposed source of supply, and the water should be conveyed in iron pipes. Never tolerate the use of leaden pipes; lead is useful only for bullets. If, owing to the scarcity of springs, it becomes necessary to resort to wells, driven wells are preferable to those that are dug, as they are less liable to surface contamination. It would be superfluous to give directions for the chemical examination of drinking water. It may be accepted as a rule that spring water, or well water in the country, will contain nothing injurious to health unless it be contaminated by organic decomposition. If we are careful to see that no privies are near the source of supply; that leaves and limbs of trees are kept out of it; that mice, rats, cats, frogs, or other dead animals, are not putrefying therein; then we will have a water that can, with safety, be used.

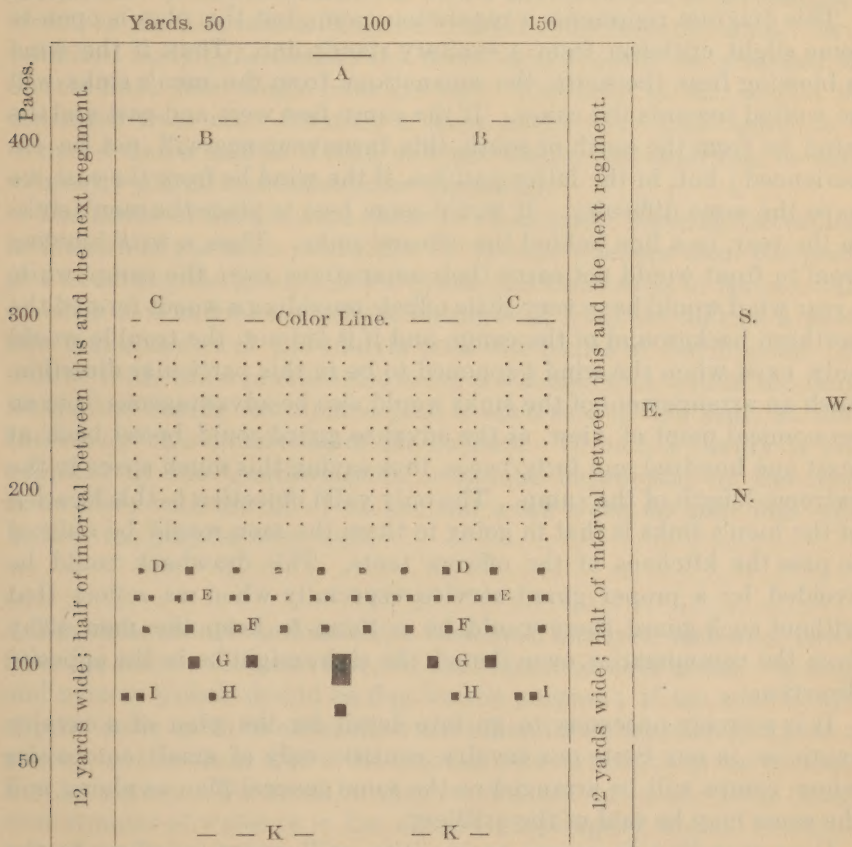
Of course, it is only because of the short duration of our annual encampments, and of the fact that our State is so well supplied with pure and wholesome water, that we are enabled to dismiss this question of water supply with so few words. This manual being mainly intended for our own medical officers, we do not deem it wise to unnecessarily increase its bulk by the discussion of questions, which, as medical officers of the National Guard of Pennsylvania, they will never be called upon to decide. Quantity is an important consideration in connection with the water supply, and, if it be not unlimited, you should see to it that you have, at least, an average of five gallons per day for each man.

It will be well, if possible, that there should be a lake, pond, river,

or large creek in the vicinity of the camp, as the facility for bathing thereby afforded will do much to preserve the health of the men. It will be a good suggestion when the site of the camp has been determined upon in the spring, to plant profusely, but with design and judgment, say around the edge of each regimental area, sunflower seeds. It is claimed by some that sunflowers possess anti-malarial properties. Whether this be true or not, there can be no question that such rapidly-growing plants do absorb and thus nullify emanations that might otherwise prove detrimental to health, while, from an æsthetic point of view, this cordon of sunflowers will add to the picturesqueness of the camp, to say nothing of the gain to the owner of the land in good chicken feed. For this same reason, a ground where the thistle abounds will make a good camp site, other things being equal.

#### Laying Out of Camp.

Having now selected the site for the encampment, we come to lay it out.



The above diagram (taken from Buck's Hygiene) gives us the plan of a regimental camp looking from the north towards the south, sup-



posing a woods, if one exists, to be located at the northern or lower end of the camp. The depth is specified in paces from the color-line, the pace being twenty-eight inches, the average step of the soldier. Ten paces in rear of the color-line (C) are the tents of the men, which are disposed in two files, with a street between, the tents opening on the street. The streets should have a length of fifty paces and a width of nine yards. The company kitchens (D) are in line parallel to the color-line and twenty paces back of the rear ends of tents. The company officers are quartered on the line (E), twenty paces in rear of the kitchens, and a depth of fifteen paces is allowed for their tents, servants' quarters and kitchens (F). Further to the rear, twenty paces, are the quarters (G) of the field and staff of the command, and behind them, twenty paces, their kitchens (H) and the tents (I) of the non-commissioned staff. Officers' sinks (K) are one hundred paces beyond, with regimental wagons, if any, parallel in the interval. The sinks of the men (B) are one hundred and fifty paces in front of the color-line, and the advance guard (A), fifty paces in front of the sinks.

This diagram represents a regulation camp, but the plan is open to some slight criticism from a sanitary standpoint. Thus, if the wind is blowing from the south, the emanations from the men's sinks will be wafted towards the camp. If the camp face west and east and the wind be from the north or south, this inconvenience will not be experienced; but, in the latter position, if the wind be from the east, we have the same difficulty. It would seem best to place the men's sinks in the rear, in a line behind the officers' sinks. Thus, a wind blowing from in front would not carry their emanations over the camp, while a rear wind would have very little effect, providing a woods formed the northern background of the camp, and if it did not, the trouble would only exist when the wind happened to be in this particular direction. Such an arrangement of the sinks would also be advantageous from an economical point of view, as the advance guard could be set back at least one hundred and forty paces, thus saving this much space in the extreme length of the camp. The only valid objection to this location of the men's sinks is that in going to them the men would be obliged to pass the kitchens of the officers' tents. This drawback could be avoided by a proper guard service, especially when we reflect that without such guard there would be nothing to keep the men away from the commissariat, even though the sinks might be in the opposite direction.

It is scarcely necessary to go into detail for the plan of a cavalry camp, as in our State our cavalry consists only of small companies whose camps will be arranged on the same general plan as above, and the same may be said of the artillery.

Over-crowding in camps, as in cities, will prove injurious to the health of the command. From the diagram furnished it will be seen that a camp for a regiment of six hundred men should cover a space

174 yards wide by 358 yards (460 paces) deep; giving an area of 62,292 yards, or 104 square yards for each man. The utmost extent of crowding permitted by the regulations consists in reducing the frontage to 124 yards, the depth remaining the same, which gives a superficies per man of seventy-four yards. The diagram provides for twenty rows of tents and thirteen in a row, which would give us 260 tents for each regiment, and with two men in each tent we would have accommodations for 520 men, a number rarely exceeded, if ever, in any of our commands. This is the proper proportion; not more than two men should occupy each of our ordinary tents, for a greater number will result in over-crowding that must prove detrimental to health. It is the over-crowding in the tents rather than the contraction of the total area of the camp that is to be avoided. These tents should be ventilated by a couple of holes near the ridge, guarded by flaps which can be looped up or let down at pleasure. Though it entails some extra labor, it is important to dig a trench around each tent, which should communicate with a similar trench in the company street, so that the rainfall may be drained away from the camp. In a battalion camp (*Hammond*) the tents should never be arranged in double line; short single lines are best. The tents in line should be separated from each other by a space at the very least equal to a diameter and a half of a tent, and the further the lines can be conveniently placed from each other the better.

The inside of tents should never be excavated. Nothing (according to *Hammond*) is more productive of zymotic diseases than the practice of cutting the ground down within the tents, so as to leave a wall of earth as a barrier against the entrance of fresh air, and as a most effectual absorber of the effluvia from the bodies of the inmates. It will be well, when practicable, to lay a wooden floor within the tent, letting the boards rest upon a joist at each side of the tent, so that there may be a circulation of air beneath. If such a luxury is not supplied by the Quartermaster, it can be improvised by the men themselves with the aid of an axe and a few trees, for split logs will answer the purpose very well.

#### Limit of Sinks.

The sinks should be located at least one hundred and fifty paces from the tents and in the rear, for the reasons already given. A deep and narrow trench should be dug for the purpose; if too wide it will require more earth to cover the excreta, and will, moreover, expose a greater surface from which the noxious effluvia will be given off than if it is narrow. We must be very careful not to locate these sinks over streams of water or in the vicinity of springs or wells. In either case the water will become contaminated and serious disease may be the result. In cavalry camps care must be taken that the horses are not stabled near the water supply, for horse refuse will prove as dan-



gerous as will that from man. The dung, straw and other refuse from the horses should be burned. It will be best to have a small sink for each company than one or two large ones for the whole regiment, because the men will be thus exposed, when attending to nature's call, to a less heterogeneous effluvium, a point of much importance in limiting the spread of miasmatic contagious disease. A comparative privacy is also ensured, which has a hygienic value, inasmuch as some men find difficulty in relieving themselves in the presence of others, and such men will seek the woods or allow the call of nature to pass unheeded. Every depression in the regimental area liable to retain water should be drained and filled up. A mess-tent, in connection with the kitchen, should be established that we may prevent the contamination of the tents with the debris of meals.

There should be one large tent, furnished with at least six cots, set aside as the hospital tent, located near to, if not adjoining the tent occupied by the surgeon or assistant surgeons of the regiment, and this tent should be indicated by a yellow flag, or better still by the words "Hospital Tent" prominently displayed thereon.

#### Sanitary Supervision of the Camp.

Having determined upon the site and supervised the sanitary laying out of the camp, the next question is its hygienic government. Order and cleanliness, so far as they relate to health and well being of the inhabitants, are embraced generically by the police system. A police party is a cleaning up detail. The soldier has even specialized the word to personal matters, for his object in going to the river or creek with towel, soap and change of under-clothing, is usually to have a "general police." The length of time during which a camp can be occupied depends greatly upon the efficiency of its police. It has been recommended that camp sites should be changed at least every eight days, if circumstances permit, but with proper government the ground can be held for a much longer period.

While it is the duty of company officers to oversee the police of their company quarters, and the personal cleanliness of their men, yet it is perfectly proper and necessary that the surgeon should make suggestions to the company officers, and should report to the regimental commander all non-compliance with his recommendations. In the regular army the surgeon is now (by an order issued in 1874) not only the *medical*, but he is also the *sanitary*, officer of his command. This order authorizes the surgeon to make inspections of all the tents or buildings, of the character and cooking of the rations, of the quantity and quality of the water supply, the drainage, and the clothing and habits of the men, and to make a report thereon in writing to his commanding officer, with such recommendations as he may deem proper. If his recommendations are not carried out, the commanding officer is required to state on the report his reasons for not acting upon them,



and to forward this report to the department commander. Such should be the status of the medical officers of our National Guard. It is one of the duties of the *officer of the day* to see that the camp is properly policed, and he is responsible to his superior for the order and cleanliness of the camp. He makes use of the prisoners in policing the grounds, and, if they are insufficient for the work, fatigue details are granted him. Very much depends upon the efficiency of this service; for, if police parties fail to remove the dangerous material from camp, then *must the camp be removed from the dangerous material*. Even with careful policing of the regimental camp, unless great watchfulness be employed, the intervals between the regiments and the thickets and ravines around are liable to become unauthorized depositories of all kinds of filth, leading to miasmatic developments from soil pollution, and, maybe, even to contamination of the water supply.

The general police details clean up the regimental area, attend to the condition of the sinks, remove kitchen refuse and stable manure, repair defective trenching for surface drainage, and keep the pathways passable in rainy weather. All refuse material should be collected into heaps, loaded into wheel-barrows, carted away and *burned*. Nothing should be left as a nidus for further accumulation. Soldiers object to doing other than their own work, so that what has been unintentionally neglected by one police party may be seen and passed over by those which succeed it, so that a watchful eye becomes all necessary. Attention should not be restricted to the regimental area; the surrounding grounds must be carefully policed, especially if related in any way to the water supply.

At the close of each day some of the earth that has been thrown up in digging the sinks should be thrown therein—enough to thoroughly cover the deposits of the day, and it will be well if a sprinkling of chloride of lime or some other disinfectant can be added thereto. When filled within two feet of the surface, each sink should be replaced by a new one, those disused being filled up and banked over with earth to mark their site. In the event of the presence in camp of such diseases as diarrhœa, dysentery, typhoid fever, cholera, etc., special disinfection of the sinks is indicated, for which purpose we may freely sprinkle a solution of bromide in the proportion of one pound to one hundred and twenty-five gallons of water, or a one to one thousand solution of corrosive of sublimate. The only way to prevent the contamination of the soil about the tents from urinary secretion is to enlist the coöperation of the men by explaining to them the danger of this practice. In bad weather the men are apt to use the spaces between the tents, while at night all parts of the company area may be converted into urinals. Unless officers are vigilant, certain angles about the tents will soon evolve ammoniacal odors. The medical officer should indicate such places as may be used for this purpose during the night, and such localities should be well scraped

and treated with chloride of lime each morning. Kitchen refuse and slops should be collected in covered barrels, removed daily, and *cremated*. On no account should anything of this kind be committed to the sinks or thrown in heaps prior to ultimate removal. Kitchen garbage is disgusting at all times, and, in addition to the insalubrity caused by its fermentation in the soil, it is provocative of much discomfort in warm weather from the myriads of flies which infest its neighborhood.

The interior of the tents must be kept scrupulously clean, and they should be thoroughly aired by opening the front and back and raising the walls after the men have left them in the morning. All bedding should be exposed to the air every day unless the weather is such as to prevent it. Straw in mattresses should not be used longer than one week, when it should be burned. If cots are in use, it should be seen that nothing of a putrescible nature be allowed to accumulate under them. Dogs are a camp nuisance that should not be tolerated; indeed, no organic contamination should be permissible in the small air space save that which, of necessity, arises from the occupancy. One of the most difficult problems of camp hygiene, particularly in our militia encampments, is that of personal cleanliness. Our citizen soldiery, deprived of the facilities for personal cleanliness that have surrounded them at home, and not being long enough in camp to acquire the habit of meeting all emergencies as well as the soldiers in time of war, seem to resign themselves to what they regard as inevitable dirtiness, and make but little effort towards personal cleanliness. Every effort must be made to counteract this unhealthy tendency. Such want of cleanliness will cause chafings and ulcerations, while, if prolonged, it may produce actual disease, for the irritation of skin caused by heat, perspiration, the contact with underclothing hardened with moisture, organic elimination, and epidermal débris from within, and dust and all manner of uncleanness from without, will lead to prickly heat, which, in cases aggravated by scratching and the browsing of the *pediculus corporis*, will become erythematous, eczematous, and form a special disease, popularly known as campitch. Of course, such an aggravated condition is not likely to occur in our short encampments, but a similar condition, in a lesser degree, will be very likely. As our encampments are always held in summer, personal cleanliness can be readily secured if we have, as has been already suggested, a pond, lake, river or creek in the vicinity.

A few words in relation to the food of the soldier will bring the manual to a close. If the soldier is a machine, as he has sometimes been called, he should be kept in good repair and well supplied with motor-power. "Armies have been disarmed by a deficient dietary, but never," says Dr. Smart, "by the overfeeding consequent on the establishment of a liberal ration." It may be stated that a soldier's ration should contain not less than thirty ounces of water-free food daily,



which should consist of albuminoids, fatty, saccharine, amylaceous and saline substances in certain proportions. The camp or active service ration of the United States army consists, as usually issued, of :

12	oz. pork or bacon, or	}	Generally issued in the proportion of $\frac{1}{3}$ pork and $\frac{2}{3}$ beef, or 3 days' pork in 10 days' ration.
20	oz. fresh beef.		
16	oz. hard bread.		
2.4	oz. beans or peas, or	}	Beans generally issued; rice occa- sionally; peas and hominy seldom.
1.6	oz. rice or hominy.		
1.6	oz. green coffee, or	}	Green coffee the usual issue.
1.28	oz. roasted coffee, or		
.24	oz. tea.		
2.4	oz. sugar.		
.04	qts. vinegar.		
.6	oz. salt.		
.04	oz. pepper.		

While the nutritive value of this issue is hardly up to the standard given above, yet it would probably answer in our summer encampments, where the regular ration is, in almost all instances, supplemented by private purchase or by the contributions of visiting friends.

JOSEPH T. EDWARDS, A. M., M. D.,  
*Chairman Committee on Preventable Diseases.*

BENJAMIN LEE, M. D.,  
*Secretary.*

EXECUTIVE OFFICE, 1532 Pine street, Philadelphia.

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Copies of this circular may be obtained by addressing the Secretary of the State Board of Health.

